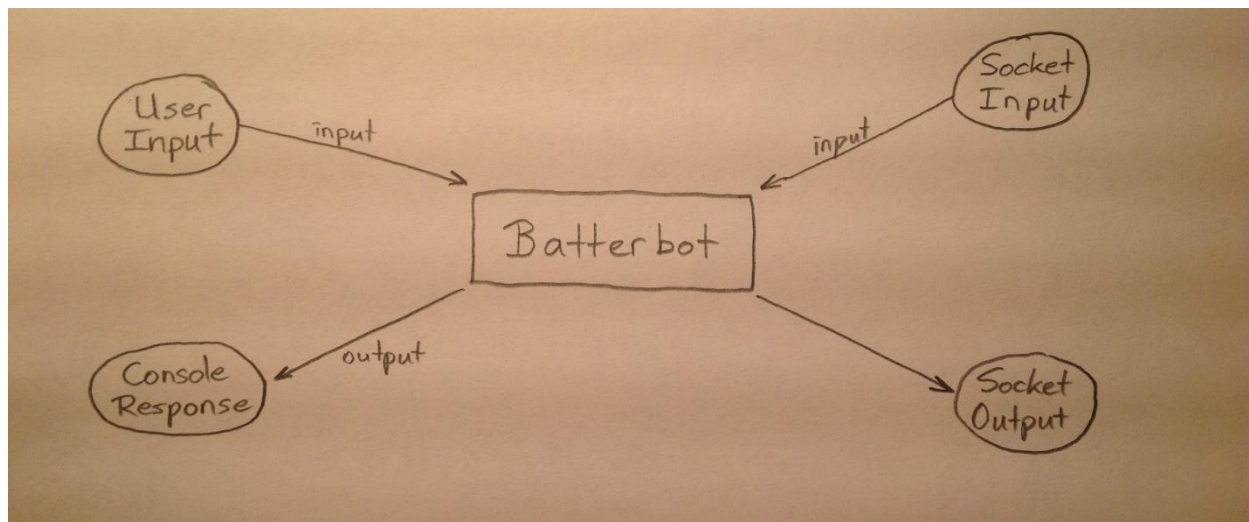


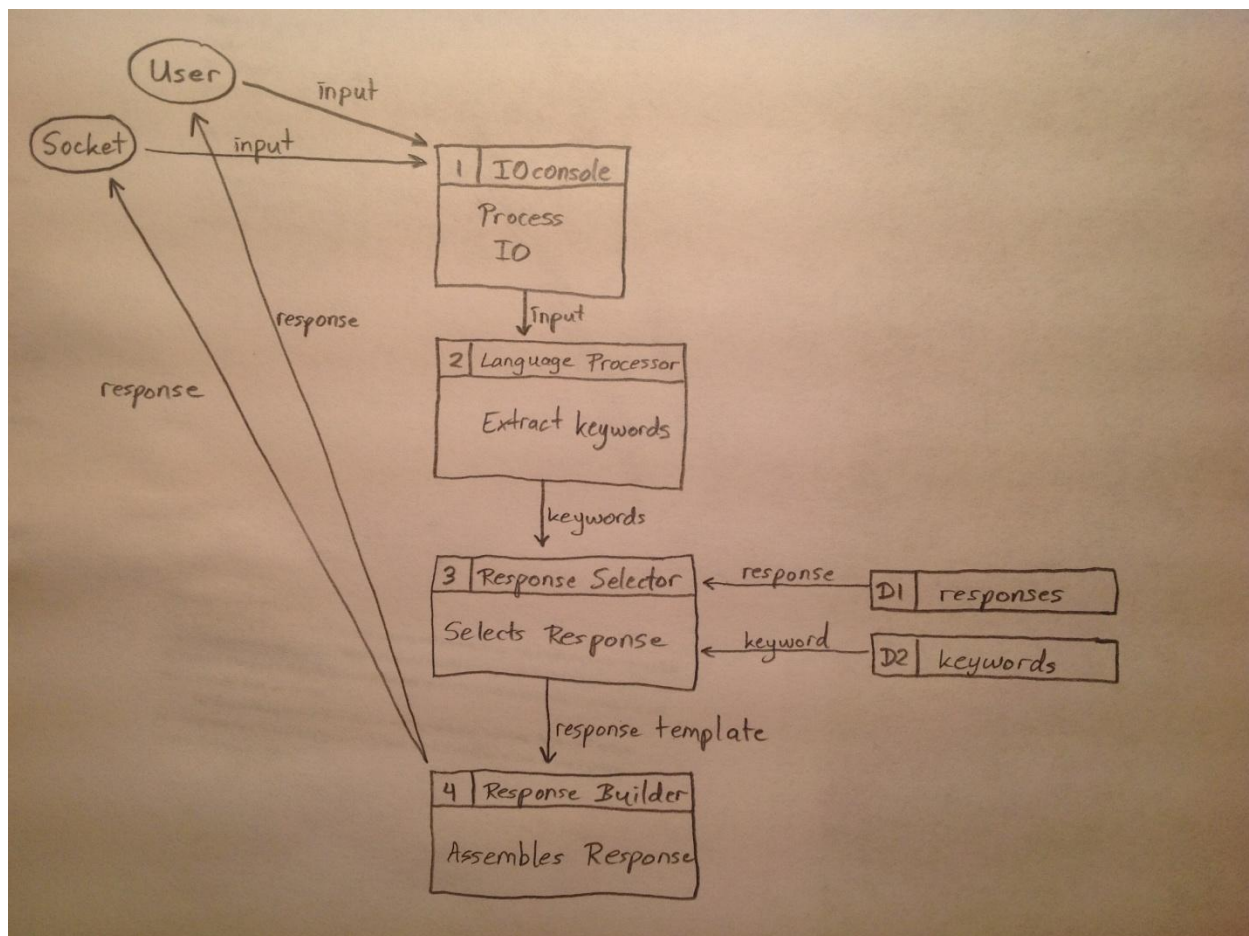
Assignment 3 Project Report

This is the project report for Assignment 3 for Ephraim Nowak. It is a continuation of the BatterBot project, with the addition of a socketed conversation which resembles a job interview.

Level 0 DFD:



Level 1 DFD:

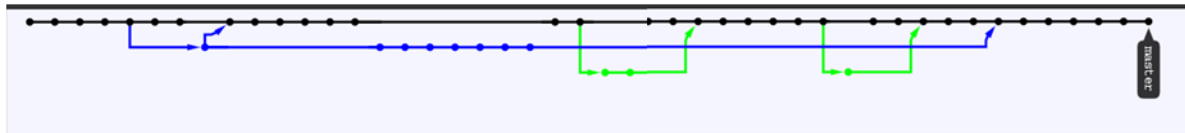


Assignment 3 Project Report

GitHub Repository:

The link to my own version of BatterBot for Assignment 3 is located here: <https://github.com/enavtech/Assignment3>

The graph below displays how different features were developed on separate branches and then merged into the master branch.



The graph below shows the commit activity for the features implemented.



Sample Output:

Connect to a server? (y/n):y

What do you expect from a supervisor?

I'd like to know more about the responsibilities and the challenges of the job prior to discussing salary.

What do you find are the most difficult decisions to make?

Well, to give an example, I once had an employer who demanded that I complete a project in a given manner. The problem was, she herself had no qualifications in the area, and didn't have an understanding of how the problem could be solved. After a couple hours of trying to explain to her that it simply couldn't be done that way, I ended up just doing it my way, but sort of made it look like I was doing as she asked. It worked out fine, with no problems.**Note: this is not something Yasha would actually say in an interview. ;)

What did you like or dislike about your previous job?

I love to read books.

What can you contribute to this company?

Assignment 3 Project Report

I am absolutely the best person for this job. I'm sure this will come as a shock, but to demonstrate my work, I've made a chatterbot to simulate me during a job interview. In fact, you're actually talking to that chatterbot right now.

What challenges are you looking for in your next job?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

What can you do for this company?

I have to be honest, I don't know much about company?, but that doesn't mean I'm not a fast learner.

What are you passionate about?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

What are you looking for in your next position?

I have to be honest, I don't know much about position?, but that doesn't mean I'm not a fast learner.

What are your salary requirements?

I'd like to know more about the responsibilities and the challenges of the job prior to discussing salary.

Tell me why you want to work here.

I like the company's values and policies. I believe in what you do, and I want to be a part of it.

What are your goals for the future?

Well, I've just graduated, so right now I'm looking to find a stable career that utilizes my education. I've heard a lot of stories about graduates who can't find work, or who end up with something that doesn't match their field at all.

If people who know you were asked why you should be hired, what would they say?

I am absolutely the best person for this job. I'm sure this will come as a shock, but to demonstrate my work, I've made a chatterbot to simulate me during a job interview. In fact, you're actually talking to that chatterbot right now.

Is there anything else I can tell you about the job and the company?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

Assignment 3 Project Report

Is there a type of work environment which you prefer?

I love to read books.

How would you describe the place at which you work?

I work at a steady pace, but usually complete my work ahead of schedule.

How would you describe yourself?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

How much do you expect to get paid?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

How would you handle it if your boss was wrong?

That really depends on the situation and the personality of the manager.

How do you measure success?

To me, success is when I am performing well and satisfied with my position, knowing that my work is adding value to my company but also to my overall life and the lives of other people.

How do you handle pressure?

I'm not a person who has a difficult time with stress. When I'm under pressure, I focus, and get the job done.

Have you gotten angry at work? What happened?

I like the company's values and policies. I believe in what you do, and I want to be a part of it.

How long do you expect to work for this company?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

Have you ever had difficulty working with a manager?

I would say that I have never really had a problem working with anyone. I try to find our common ground, and get along with everyone's different personality.

Do you take work home with you?

When I need to, no problem. I realize the importance of meeting deadlines and getting work done on time.

Assignment 3 Project Report

Describe your work style.

I am very focused on my work, and consequently, am able to work quickly.

This conversation was a sample of the conversation which was done via sockets.

The program is still limited in a few areas. One area is the extraction of keywords, in which the bot sometimes mistakes substring of a keyword as a keyword. For example, the word houseboat may be recognized as 'house' and 'boat', and thereby trigger an incorrect, or 'I don't understand' response.

What is a houseboat?

<Batterbot>My house is located in Gotham City.

The program also has difficulties with combining questions into the catch-all responses.

Tell me about the planet mars.

<Batterbot>Tell me about the planet mars.? Is that the kind of question to ask Batman?

okay

<Batterbot>What about okay?

More example conversation snippets are found in the README file.

Features for API:

- The language processor could be made available. It is used to extract key words from user input.
- The response builder is used to construct logical responses based on user input, and could be made into an API.
- In conjunction with the response builder, the response selector is used to determine which response to display, and more importantly when to display it. It includes features for tracking how often a response has been used, and when in a conversation to use the response to guide natural conversational flow.
- Response templates can also be made available as API's as they are used to create variable responses with substitutions available for words or phrases.

Assignment 3 Project Report

- Similarly, the scale rules used by the program can be made available as an API. They encapsulate the weighting of various keywords to ensure the most relevant response is selected.

README File

README

Last Updated March 14, 2014

Purpose

The purpose of this code is to provide an advanced chat bot engine, and an example BatterBot.

Using the code

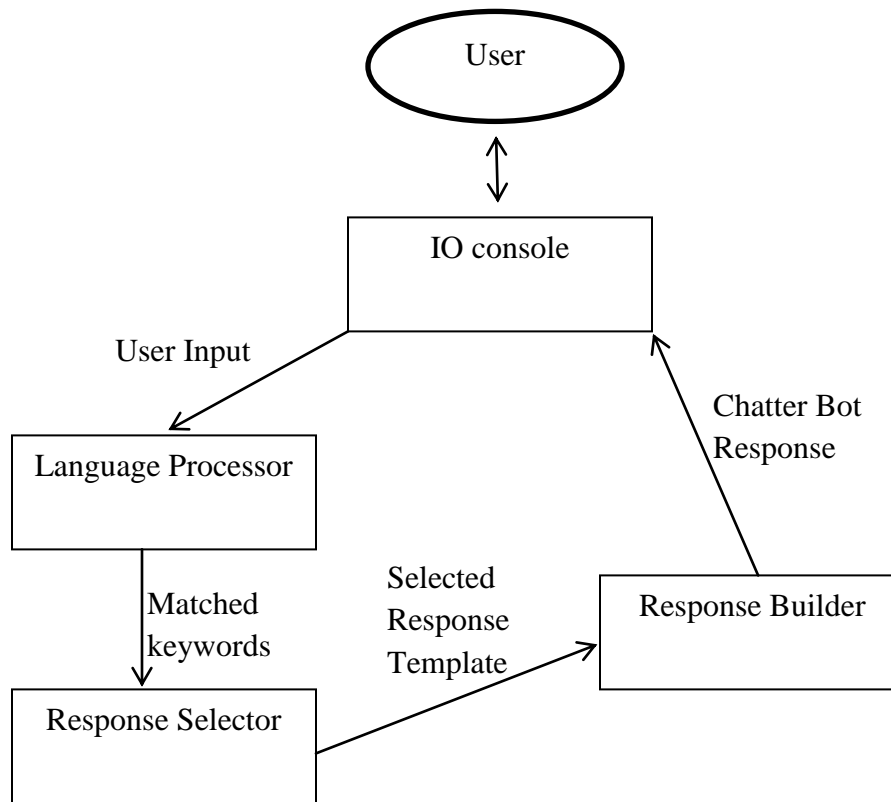
The current version of this code is only designed to be used through the eclipse console. The code can then be used by creating a project in eclipse, bringing in the relevant files, and running the BatterBotDriver class, which contains a main method which will initiate the conversation cycle. You can create your own chatter bot by creating a method that will create new Response Templates, and calling the cycle() method.

Simple System Overview:

We begin by examining the flow of data by defining five main components in our system. We have the Language Processor, the Response Selector, the Response builder, and the IO controller. Another critical component of the system is the Response Template class, which we discuss more in the next section. Using these components, we can construct the basic cycle observed when the user enters an input string.

The program starts with the IO console reading the user input. This input String is then given to the Language Processor, which extracts from the input all of the recognized keywords. These matched keywords are then passed to the Response Selector. The Response Selector ranks all of the relevant response templates, selecting the one with the most matched keywords. This Response Template is then passed to the Response Builder. Each Response Template contains a String with some blanks and possible variable substitutions. The Response Builder then fills in these blanks with the variable substitutions, and hands the complete string to the IO console to be printed. The cycle then repeats.

Assignment 3 Project Report



BatterBotDriver

We use a driver class `BatterBotDriver` which contains all of the components needed for the Chatter Bot. This class also stores the main function `cycle()` which iterates through the user input and chatter bot response cycle. Additionally, there is a method `setup()`, which can be used to load our sample Batter Bot Response Template files.

IO Console

The current IO class is very simple, and is simply used to read user input from the eclipse console, and then print the chatter bot responses.

IO Socket

This IO class establishes a client socket connection to YashaBot, given the host IP address and port number. It then reads the user input from the eclipse console and sends it to the server, and then prints the reply to the eclipse console.

Language Processor

Our implementation of the Language Processor is relatively simple. The Language Processor takes in the user input as a String. The Language Processor then loops through a list of all of the

Assignment 3 Project Report

known keywords, and searches through the user input looking for each one. Every keyword that is found is then stored in a list, which is passed to the Response Selector.

Response Selector

The Response Selector contains a reference to a Hash Table storing pointers to all of the Response Templates. The keys for the hash table are the keywords, and the values are then the pointers to the Response Templates. This allows for quickly finding all of the relevant Response Tables based on a set of found keywords. The response selector now also uses the Java API for WordNet Synonyms (JAWS), which allows it to select responses based on synonyms of keywords.

Response Builder

Given a Response Template as input, the Response Builder fills in the canned sentence with its variable substitutions and returns the response as a string. A variable substitution may optionally come from the memTable, which contains previous user input.

MemTable

This is a dictionary data structure used to store previous user input. For example, the key may be “Name” and the value “John Doe”. When the question “What is your name?” Is asked, the response would then be parsed and stored in the memTable.

Response Template

The Response Template is a class used to store the ‘canned’ sentences and their variable substitutions. Each Response Template will contain:

- An output sentence with possible blanks to be filled in
- The Array of buckets, which contain the variable substitutions
- A list of key words that will trigger that response to be selected

Additionally, a Response Template may contain a scaleRules function definition, which allows for more complicated selection rules to be defined. This function should return a value that will multiply the normal ranking determined by the number of relevant keywords. For example, supposing that the given response should only be said once, the function scaleRules could return 1 if the response has not yet been used and a value of 0 if the response already has been used. Alternatively, this function could be used to increase the weight of the responses ranking by using a number larger than 1. This should be used with caution.

If a Response Template is asking a question of the user, for example, “What is your phone number?” then the response Template must also define an additional step for interpreting the

Assignment 3 Project Report

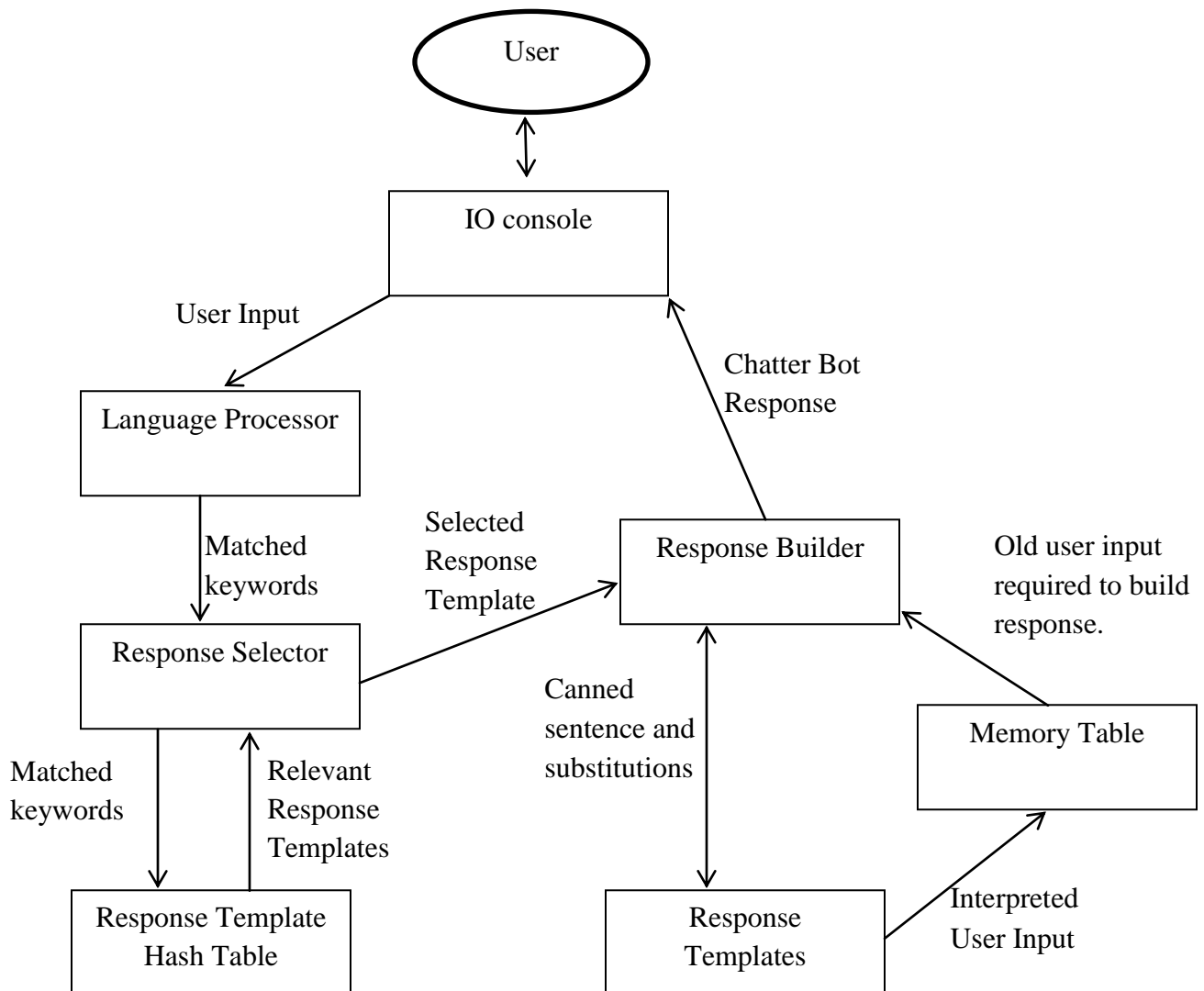
following user input. In our example, this would mean extracting the phone number from the response. The Response Template then also needs to have a memTable key, called memEntry, which is the key that will be used to store that user response in the memTable.

KeyWordList

We have created our own class, the KeyWordList, which is used to store a list of keywords. This class is very simple, and was designed to facilitate the integration of new features in the future. Currently it simply wraps an array of Strings.

Detailed System Diagram

A more complete diagram of the relationship between the different parts of the system can be made using the more detailed information about each class.



Assignment 3 Project Report

We note that this diagram is incomplete in that it does not show the flow of data from the IO console to the Response Template class. The previously used Response Template is also responsible for parsing the user input in the event that the user's response needs to be stored in the Memory Table.

Assignment 3 Updates

The README file has been updated to reflect changes implemented since Assignment 2.

New features implemented are:

- An extra topic of 30 job interview questions has been added for use in the conversation with YashaBot via sockets. This conversation simulates a job interview, with this chat bot being the interviewer, and YashaBot being the interviewee. This feature expanded the conversation capabilities of the chat bot.

<Interviewer>What do you find are the most difficult decisions to make?

Well, to give an example, I once had an employee who demanded that I complete a project in a given manner. The problem was, she herself had no qualifications in the area, and didn't have an understanding of how the problem could be solved. After a couple hours of trying to explain to her that it simply couldn't be done that way, I ended up just doing it my way, but sort of made it look like I was doing as she asked. It worked out fine, with no problems. **Note: this is not something Yasha would actually say in an interview. ;)

<Interviewer>Tell me why you want to work here.

I like the company's values and policies. I believe in what you do, and I want to be a part of it.

<Interviewer>How would you handle it if your boss was wrong?

That really depends on the situation and the personality of the manager.

- A feature which enables the chat bot to give 5 variable responses to user entered input outside the scope of the agent's conversational span. This allows the chat bot to respond with a more natural reply to conversations it does not know about. Some of these responses were implemented such as to extract key words from the input and incorporate them into a response.

Assignment 3 Project Report

Tell me about the universe

<Batterbot>What about the universe?

Who is Rob Ford?

<Batterbot>Who is Rob Ford? Is that the kind of question to ask Batman?

- Synonym recognition was implemented using the Java API for WordNet Synonyms (JAWS). This allows synonyms of keywords to be checked against the available replies to give proper replies to input which may not have the exact input BatterBot has in its key word lists.

How tall are you?

<Batterbot>I'm 6'2 and 210 lbs...let's stick to crime fighting questions! I don't like being objectified.

What is your height?

<Batterbot>I'm 6'2 and 210 lbs...let's stick to crime fighting questions! I don't like being objectified.

- The chat bot also has the implemented feature of being able to carry a conversation with another agent. This was done via sockets, and this client agent can connect to the YashaBot (by Yasha Pushak) server and have a 30 turn conversation.

Connect to a server? (y/n):y

How do you measure success?

<YashaBot>To me, success is when I am performing well and satisfied with my position, knowing that my work is adding value to my company but also to my overall life and the lives of other people.

What are your goals for the future?

<YashaBot>Well, I've just graduated, so right now I'm looking to find a stable career that utilizes my education. I've heard a lot of stories about graduates who can't find work, or who end up with something that doesn't match their field at all.